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Notes on Lichen Distribution in the Upper Mississippi Valley

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Under the above caption I shall discuss briefly certain features regarding past investigations of the distribution of lichens within the northern portion of a somewhat extended biological area, and make certain suggestions as to the amount and kind of work yet needed to an approximate completion of the study of these plants within the area treated. Since it has been the custom, in the region under consideration, for states to engage more or less extensively in botanical surveys, quite a number of papers have appeared, from time to time, dealing wholly or in part with lichen distribution within certain states or parts of states. Titles of these and other papers upon which this report is largely based are given in a bibliography of thirty-two titles.

Since a definite statement as to territory covered may be advantageous at the outset, I may state that I have confined myself to the following states: Missouri, Kansas, Nebraska, South Dakota, Minnesota, Wisconsin, Iowa, Illinois, Indiana, and Ohio. This list of states includes, so far as I have been able to ascertain through published bibliographies and correspondence with botanists, all the states in the upper valley in which any investigations of the lichen flora have been made and which do not extend into the mountainous regions to the east or west of the area selected. If any botanist can suggest to me any paper, bearing upon the subject, which I have overlooked, or any unpublished work which should receive consideration, he will confer a great favor and aid

in the study. Portions of states joining those named above on the west and east properly come within the territory as stated in my title, but the enumerations from those states are usually made in such a way that it is not possible to know in what portion of the states the plants were collected.

The work of collecting and classifying these plants in the area under consideration is, except in a few of the best studied localities, only well begun. Minnesota has furnished somewhat more than 350 lichens, and this number will be considerably increased as the survey of the state progresses. The whole area covered in this paper has thus far furnished only 527 lichens, or some 165 not found in the one state named above.

Considerable material collected in the various states is still undetermined, and some of it is the more difficult, containing many interesting species and some new ones. Indeed the numbers for the whole area can doubtless be doubled by more complete exploration. Although states seldom form natural biological areas, botanists residing in the various states will doubtless want to know the number of lichens recorded from each state. They are as follows: Minnesota, 348; Illinois, 248; Iowa, 226; Ohio, 180; Nebraska, 160; South Dakota, 76; Kansas, 47, Indiana, 30; Wisconsin, 29; Missouri, 9. Of those from Wisconsin, 21 are listed from a collection made by Professor L. H. Pammel, at La Crosse, and determined by me, remarkable for the number of interesting plants in so small a collection. The bibliographical reference of W. W. Calkins* to work by J. A. Lapham in Wisconsin was investigated and the conclusion was reached that the reference was incorrect; all the volumes of the series from which the citation is given were searched, and as yet nothing is found in print concerning Wisconsin lichens, except in Tuckerman's Synopsis. Other species added to published lists from the states are eight from Kansas, which I determined for E. Bartholomew and R. Dunlevy, and one of my own collecting in Illinois. These are indicated in the list by adding (P), (B), (D) and (F) respectively, after the name of the state.

The reports upon which this paper is based are in part preliminary, and the specimens collected, some of which I have not

* Calkins, W. W., 5 (number referring to bibliography published herewith).

seen, are deposited in various herbaria. As the determinations were made by various persons, doubtless some of the names of species listed are affected by the personal element in determination, and specimens named differently would in some instances almost certainly prove to be identical specifically could they be compared. However, the reports add much to our knowledge of the distribution of North American lichens as given by Tuckerman,* as much of the work in all of the states considered except Missouri, has been done since his death in 1886.

The papers referred to above have been too frequently mere lists, simply giving species and locality with no notes as to substrata or frequency of occurrence, and much less as to the causes which have led to the various peculiar features of distribution and habitat. So far as I know, the first paper to treat the subject of distribution in anything like a satisfactory manner was that by Mr. T. A. Williams† upon the lichens of the Black Hills. Since that time Professor C. Macmillan‡ has touched upon certain features, and the writer§ has attempted in several papers to consider lichen distribution in a somewhat adequate manner, presenting, to some extent, different phases of the subject in different papers as various localities and the progress of the work brought special problems into prominence.

Some of the interesting questions which may well claim the attention of lichen collectors in the future are as follows: Why are some regions richer in species and individuals than others? Why do certain areas produce a relatively large proportion of epiphytic, lithophytic, or epigeal lichens? Why are lichens commonly epiphytic, lithophytic or epigeal found on other substrata in certain localities? Where are, and what constitute the dividing lines between licheno-biological areas? What particular lichen-floral elements predominate in certain regions and why? Why do we find rapid changes in the lichen-flora in passing a certain distance or in a certain direction from one place and not in going the same distance from some other locality or in a different direction from the

* Tuckerman, E., 21 and 22.

† Williams, T. A., 28.

‡ Macmillan, C., 18.

§ Fink, B., 11, 12, 13, 14 and 15.

same place? To what extent can one predict as to what species will inhabit certain substrata in one region from knowledge of species found upon like substrata in other localities? To what extent do fruticulose and foliaceous lichens seek different substrata than those occupied by crustaceous species? What evidence does the present composition of a lichen-flora furnish concerning the former composition, the migrations which have taken place and their direction, and the struggle which has brought about the present floral composition?

In answering these questions, the various ecologic factors which influence the distribution of lichens must be kept in mind. Those which have especially attracted notice in my studies are the particular kinds of substrata in a region; changes in these substrata through the destruction of old and the introduction of new ones naturally, or through some animate and commonly human agency; climatic conditions of heat and moisture at present, and, in some instances, in the past as well; amount of illumination; the effects of bodies of water in bringing moisture; direction of prevailing winds influencing temperature; permanency and age of substrata and elevation of land. Other factors will present themselves to the careful observer. What I have outlined here is intended to be merely suggestive, and, for more detailed account, I must give reference to some 250 pages in the papers cited above from the three authors named. It is to be hoped that the important factors suggested above as influencing lichen distribution, and any others which may be brought out in actual work in the field in the future may be kept in mind by lichen collectors; and, if this brief paper shall in any degree aid in bringing about this result, the improvement in results in the lichenological field of work will be ample reward.

Notes regarding new or critical species might be added here, but I prefer to leave such work for future papers, adding here only a list of the 527 lichens hitherto found in the area under consideration and indicating the distribution by states. I have followed the arrangement, and, in general, the synonymy of Tuckerman, the latter of which is faulty in many instances, but which must serve till time is afforded for correcting it by careful research. Regarding the collections made by Dr. C. C. Parry and determined by the writer,* I have not been able to ascertain which were made in Wis-

* Fink, B., 8.

consin and which in Minnesota. Consequently, I have recorded but a single plant from this collection, the plant being otherwise unknown in either state. All of the others collected by him have been found since in Minnesota, and Wisconsin alone suffers in number of lichens by the uncertainty.

LIST OF SPECIES AND VARIETIES

- Ramalina calicaris* (L.) Fr.—Ia., Ill., O., Neb., Ind.
Ramalina calicaris fraxinea Fr.—Minn., Ia., Ill., Neb.
Ramalina calicaris fastigiata Fr.—Minn., Ia., Ill., O.
Ramalina calicaris canaliculata Fr.—Minn., Ia., O.
Ramalina calicaris farinacea Schaer.—Minn., Ia.
Ramalina polymorpha (Ach.) Tuck.—Minn.
Ramalina pusilla (Prev.) Tuck.—Minn.
Ramalina pusilla geniculata Tuck.—Minn.
Ramalina pollinarella Nyl.—Minn.
Ramalina pollinaria (Ach.) Tuck.—S. D., O.
Cetraria islandica (L.) Ach.—Minn.
Cetraria aleurites (Ach.) Th. Fr.—Ill., O.
Cetraria ciliaris (Ach.) Tuck.—Minn., Ia., Ill., O.
Cetraria lacunosa Ach.—Minn.
Cetraria aurescens Tuck.—Minn., O.
Cetraria juniperina pinastri Ach.—Minn.
Cetraria saepincola (Ehrh.) Ach.—Minn.
Evernia vulpina (L.) Ach.—Neb., Minn. or Wis.
Evernia furfuracea (L.) Mann.—Minn., D.
Evernia prunastri (L.) Ach.—Minn., Ia., O., Neb.
Usnea barbata (L.) Fr.—Ia., Ill., O., Ind., Neb., S. D.
Usnea barbata florida Fr.—Minn., Ia., Ill., O., Neb.
Usnea barbata strigosa Ach.—Ill.
Usnea barbata hirta Fr.—Minn., Ia., O., Neb.
Usnea barbata rubiginea Michx.—Minn., Ill., O.
Usnea barbata ceratina Schaer.—Minn., Ia.
Usnea barbata dasypoga Fr.—Minn.
Usnea barbata plicata Fr.—Minn., Ia.
Usnea angulata Ach.—Minn., Ia., O.
Usnea trichodea Ach.—Minn.
Usnea longissima Ach.—Minn.

- Usnea cavernosa* Tuck.—Minn., Ia.
- Alectoria jubata* (L.) Tuck.—Minn.
- Alectoria jubata chalybeiformis* Ach.—Minn., Ia., Ill.
- Alectoria jubata implexa* Fr.—Minn., S. D.
- Speerschneidera euploca* (Tuck.) Trev.—Kan.
- Theloschistes chrysophthalmus* (L.) Norm.—Minn., Ia., Ill., Neb., Kan., Wis. (P.).
- Theloschistes parietinus* (L.) Norm.—Ia., Ill., O., Neb., Wis., Kan. (B.).
- Theloschistes polycarpus* (Ehrh.) Tuck.—Minn., Ia., O., Neb., S. D.
- Theloschistes lychnus* (Nyl.) Tuck.—Minn., Ia., Ill., Neb., Kan. (B.).
- Theloschistes concolor* (Dicks.) Tuck.—Minn., Ia., O., Neb., Kan., Ind.
- Theloschistes concolor effusa* Tuck.—Minn., Ia., Neb., Kan.
- Parmelia perlata* (L.) Ach.—Minn., Ia., Ill., O.
- Parmelia perlata olivetorum* Ach.—Ill.
- Parmelia perforata* (Jacq.) Ach.—Minn., Ia., Ill., O., Neb., Wis., Ind.
- Parmelia perforata hypotropa* Nyl.—Minn.
- Parmelia cetraria* Ach.—Minn., Ia., Ill., O.
- Parmelia laevigata* (Sm.) Nyl.—Ill.
- Parmelia aurulenta* Tuck.—Ill.
- Parmelia crinita* Ach.—Minn., Ia., Ill., O., Neb.
- Parmelia tiliacea* (Hoffm.) Flk.—Minn., Ia., Ill., O., Neb., Ind.
- Parmelia tiliacea sublaevigata* Nyl.—Minn., Neb.
- Parmelia tiliacea sulphurosa* Tuck.—Ill., Neb.
- Parmelia Borreri* Turn.—Minn., Ia., Ill., O., Neb., Kan.
- Parmelia Borreri hypomela* Tuck.—Minn.
- Parmelia Borreri rudecta* Tuck.—Minn., Ia., Ill., Neb.
- Parmelia saxatilis* (L.) Fr.—Ia., Ill., O., Ind.
- Parmelia saxatilis rosaeformis* Ach.—Ill.
- Parmelia saxatilis sulcata* Nyl.—Minn., Ia., Ill., O.
- Parmelia saxatilis panniformis* Ach. Schaer.—Minn.
- Parmelia physodes* (L.) Ach.—Minn., Ill.
- Parmelia encausta* (Sm.) Nyl.—Minn.
- Parmelia pertusa* (Schrank.) Schaer.—O.

- Parmelia colpodes* (Ach.) Nyl.—Ill., O., Neb., Ind.
Parmelia olivacea (L.) Ach.—Minn., Ia., O., Neb., S. D.
Parmelia olivacea prolixa Ach.—Minn., Ill.
Parmelia olivacea aspidota Ach.—Ia., Ill.
Parmelia caperata (L.) Ach.—Minn., Ia., Ill., O., Neb., S. D., Ind.
Parmelia conspersa (Ehrh.) Ach.—Minn., Ia., Ill., Neb., S. D.
Parmelia molliuscula Ach.—Neb., S. D.
Parmelia centrifuga (L.) Ach.—Minn.
Physcia speciosa (Wulf., Ach.) Nyl.—Minn., Ia., O., Ill., Neb.
Physcia hypoleuca (Muhl.) Tuck.—Minn., Ia., Ill., O.
Physcia granulifera (Ach.) Tuck.—Minn., Ia., Ill.
Physcia comosa (Eschw.) Nyl.—Ia., O., Ill.
Physcia leucomela (L.) Michx.—O.
Physcia ciliaris (L.) DC.—Minn.
Physcia aquila (Ach.) Nyl.—Minn., Ia.
Physcia aquila detonsa Tuck.—Minn., Ill., O.
Physcia pulverulenta (Schreb.) Nyl.—Minn., Ia., Ill., O., Neb., S. D.
Physcia pulverulenta leucoleiptes Tuck.—Minn., O., Neb.
Physcia Leana Tuck.—O.
Physcia stellaris (L.) Tuck.—Minn., Ia., O., Ill., Neb., S. D., Kan., Ind., Wis. (P.).
Physcia stellaris apiola Nyl.—Minn., Ia., Ill.
Physcia astroidea (Fr.) Nyl.—O.
Physcia tribacia (Ach.) Tuck.—Minn., Ia., Ill., O.
Physcia hispida (Schreb., Fr.) Tuck.—Minn., Neb.
Physcia caesia (Hoffm.) Nyl.—Minn., Ia., Ill., O.
Physcia caesia stellata Fr.—Ill.
Physcia obscura (Ehrh.) Nyl.—Minn., Iowa, Ill., O., Neb., Kan.
Physcia adglutinata (Flk.) Nyl.—Minn., Ia., Ill., O., Neb., Wis., Kan.
Pyxine cocoes (Sw.) Nyl.—Ill.
Pyxine sorediata Fr.—Minn., Ia., Ill., O., Neb.
Umbilicaria rugifera Nyl.—Neb., S. D.
Umbilicaria cylindrica (L.) Delis.—S. D.
Umbilicaria Muhlenbergii (Ach.) Tuck.—Minn.

- Umbilicaria Muhlenbergii alpina* Tuck.—S. D.
Umbilicaria vellea (L.) Nyl.—Minn., S. D.
Umbilicaria Dillenii Tuck.—Minn., O.
Umbilicaria pustulata (L.) Hoffm.—Minn., O., Neb., S. D.
Umbilicaria hyperborea Hoffm.—Minn.
Sticta amplissima (Scop.) Mass.—Minn., O., S. D., Wis., Ind.
Sticta herbacea (Huds.) Ach.—Ill.
Sticta aurata (Sm.) Ach.—O., Neb.
Sticta pulmonaria (L.) Ach.—Minn., Ia., O., Wis., Ind.
Sticta quercizans (Michx.) Ach.—O.
Sticta limbata (Sm.) Ach.—Minn.
Sticta crocata (L.) Ach.—Minn.
Sticta scorbiculata (Scop.) Ach.—Minn.
Nephroma tomentosum (Hoffm.) Koerb.—Minn.
Nephroma helveticum Ach.—Minn., O., Ind.
Nephroma laevigatum Ach.—Minn., Ill., Ind.
Nephroma laevigatum parile Nyl.—Minn.
Peltigera venosa (L.) Hoffm.—Minn.
Peltigera aphthosa (L.) Hoffm.—Minn., O., S. D.
Peltigera horizontalis (L.) Hoffm.—Minn., Ia., O., Neb., S. D.
Peltigera polydactyla (Neck.) Hoffm.—Minn., Ia., Ill., O., Neb.
Peltigera scutata (Dicks.) Leight.—O.
Peltigera rufescens (Neck.) Hoffm.—Minn., Ia., Ill., O., S. D.
Peltigera pulverulenta (Tayl.) Nyl.—Ia., Wis., (P.).
Peltigera canina (L.) Hoffm.—Minn., Ia., Ill., O., Neb., S. D.,
 Kan., Ind.
Peltigera canina spongiosa Tuck.—Minn., O., S. D.
Peltigera canina spuria Ach.—Minn., Ia., O., Neb.
Peltigera canina soreciata Schaer.—Minn., Ia.
Peltigera canina membranacea (Ach.) Nyl.—S. D.
Solorina saccata (L.) Ach.—Minn., S. D.
Heppia Despreauxii (Mont.) Tuck.—Minn., Ia., Ill., O., Neb.
Heppia polyspora Tuck.—Minn., Neb.
Pannaria languinosa (Ach.) Koerb.—Minn., Ia., Neb., Kan.
 (D.).
Pannaria rubiginosa (Thunb.) Delis.—O.
Pannaria microphylla (Sw.) Delis.—Minn., Ia., Ill., O.
Pannaria leucosticta Tuck.—Ill., O.

- Pannaria crossophylla* Tuck.—Ill., O.
Pannaria molybdaea cronia Nyl.—Ill.
Pannaria lepidiota Th. Fr.—Minn.
Pannaria flabellosa Tuck.—Minn.
Pannaria Petersii Tuck.—Ia.
Pannaria nigra (Huds.) Nyl.—Minn., Ia., Ill., Neb., S. D.,
 Kan.
Pannaria nigra caesia Nyl.—Ia.
Pannaria byssina (Hoffm.) Tuck.—Ill.
Ephebe pubescens Fr.—Minn., Ill.
Ephebe solida Born. (?)—Minn.
Pyrenopsis Schaereri (Mass.) Nyl.—Ill.
Pyrenopsis phaeococca Tuck.—Minn., Ill.
Pyrenopsis melambola Tuck.—Minn.
Omphalaria Kansana Tuck.—Minn., Kan.
Omphalaria pulvinata Nyl.—Minn., Ia., Neb.
Omphalaria phyllisca (Wahl.) Tuck. (?)—Minn.
Omphalaria umbella Tuck.—Ia.
Collema pycnocarpum Nyl.—Minn., Ia., Ill., O., Neb., Kan.
Collema cyrtaspis Tuck.—Minn., Ill., O., Neb.
Collema laciniatum Ach.—Neb.
Collema microphyllum Ach.—Ill.
Collema verruciforme Nyl.—Ill.
Collema aggregatum Nyl.—Neb.
Collema flaccidum Ach.—Minn., Ia., Ill., O., Neb.
Collema leptaleum Tuck.—Ill., Neb.
Collema nigrescens (Huds.) Ach.—Minn., Ia., Ill., O., Neb.
Collema ryssoleum Tuck.—O.
Collema pulposum (Bernh.) Nyl.—Minn., Ia., Ill., O., Neb., S. D.
Collema tenax (Sw.) Ach.—Minn., Ia., Ill., O., Mo.
Collema crispum Borr.—Minn., Ia., O.
Collema limosum Ach.—Ill.
Collema plicatile Schaer.—Minn., Ia.
Collema furvum (Ach.) Nyl.—Minn., Ia.
Collema granosum (Wulf.) Schaer.—Ill.
Collema pustulatum Ach., Minn.—Ia., Ill.
Leptogium bolacinum Stizenb.—Ill.
Leptogium tenuissimum (Dicks.) Koerb.—Ill.

- Leptogium caesiellum* Tuck.—Ill.
- Leptogium minutissimum* (Flk., Schaer.).—Mass., Ill.
- Leptogium lacerum* (Sw.) Fr.—Minn., Ia., Ill., O., S. D.
- Leptogium lacerum pulvinatum* Moug. & Nestl.—Minn.
- Leptogium pulchellum* (Ach.) Nyl.—Minn., Ia., Ill., O., S. D.
- Leptogium tremelloides* (L.) Fr.—Minn., Ia., Ill., O.
- Leptogium juniperinum* Tuck.—Ill., O.
- Leptogium dactylinum* Tuck.—Ill., Neb., S. D., Mo.
- Leptogium chloromelum* (Sw.) Nyl.—Minn., Ia., Ill., O.
- Leptogium myochroum* (Ehrh., Schaer.) Tuck.—Minn., Ia., Ill., O.
- Leptogium myochroum tomentosum* Schaer.—Minn.
- Leptogium myochroum saturnium* Schaer.—Minn., Ill., O.
- Placodium elegans* (Link.) DC.—Minn., Ia., Neb., S. D.,
Wis. (P.).
- Placodium murorum* (Hoffm.) DC.—Minn., Ia.
- Placodium murorum miniatum* Tuck.—Minn.
- Placodium cirrochroum* (Ach.) Hepp.—S. D.
- Placodium fulgens* (Sw.) DC.—Neb., S. D.
- Placodium fulgens bracteatum* Ach.—Neb., S. D.
- Placodium cinnabarrinum* (Ach.) Anz.—Minn., Ia., Ill., O.
- Placodium microphyllum* Tuck.—Minn., Ia., Ill., Neb., S. D., O.
- Placodium citrinum* (Hoffm.) Leight.—Minn., Ia., Neb., S. D.,
Kan.
- Placodium aurantiacum* (Light) Naeg. & Hepp.—Minn., Ia.,
Ill., O., Neb., Kan., Mo., Wis. (P.).
- Placodium cerinum* (Hedw.) Naeg. & Hepp.—Minn., Ia., Ill.,
O., Neb., Kan., Wis., (P.).
- Placodium cerinum sideritis* Tuck.—Minn., Ia., Ill.
- Placodium cerinum pyracea* Nyl.—Minn., Ia., Neb.
- Placodium ferrugineum* (Huds.) Hepp.—Minn., Ia., Ill., O.,
Kan., Wis. (P.).
- Placodium ferrugineum Bolanderi* Tuck., S. D.
- Placodium ferrugineum Pollinii* Tuck.—Minn., Ia., Ill., Neb.
- Placodium vitellinum* (Ehrh.) Naeg. & Hepp.—Minn., Ia., Ill.,
Neb., S. D., Wis. (P.), Kan. (D.).
- Placodium vitellinum aurellum* Ach.—Minn., Ia.
- Placodium camptidium* Tuck.—Ill., O.
- Lecanora rubina* (Vill.) Ach.—Minn., Ia., Neb., S. D.

- Lecanora rubina opaca* (Ach.) Fr.—Neb., S. D.
Lecanora rubina heteromorpha Ach.—Minn., Ia.
Lecanora Haydeni Tuck.—Neb., S. D.
Lecanora muralis (Schreb.) Schaer.—Minn., Ill., Neb., S. D.,
 Kan. (D.).
Lecanora muralis versicolor Fr.—Minn., Ia., Neb.
Lecanora muralis saxicolor Schaer.—Minn., Ia., Neb., S. D.
Lecanora muralis Garovaglii Auz.—Neb.
Lecanora muralis diffracta Fr.—Minn.
Lecanora pallida (Schreb.) Schaer.—Minn., Ia., Ill., O., Ind.
Lecanora pallida cancriformis Tuck.—Ia.
Lecanora miculata Ach.—O.
Lecanora frustulosa (Dicks.) Mass.—Minn., S. D.
Lecanora sordida (Pers.) Th. Fr.—Minn., S. D.
Lecanora subfusca (L.) Ach.—Minn., Ia., Ill., O., Neb., S. D.,
 Kan., Ind., Wis. (P.).
Lecanora subfusca discolor Fr.—Ill.
Lecanora subfusca allophana Ach.—Minn., Ia., Ill.
Lecanora subfusca hypnorum Schaer.—Minn.
Lecanora subfusca argentata Ach.—Minn., Ia., Ill., Neb.
Lecanora subfusca coilocarpa Ach.—Minn., Ia., Neb.
Lecanora subfusca distans Ach.—Minn., Ill., O., Neb.
Lecanora atra (Huds.) Ach. ?—Minn.
Lecanora Hageni Ach.—Minn., Ia., Ill., O., Neb., Kan., Mo.
Lecanora Hageni sambuci (Pers.) Tuck.—Minn., Ill.
Lecanora varia (Ehrh.) Nyl.—Minn., Ia., Ill., O.
Lecanora varia symmicta Ach.—Minn., Ia., Ill.
Lecanora varia saepincola Fr.—Minn., Ia., Neb.
Lecanora brunonis Tuck.—Neb.
Lecanora athrocarpa (Dub.) Nyl.—Ill.
Lecanora erysibe Nyl.—Minn., Ia., Ill.
Lecanora perproxima Nyl.—Ill.
Lecanora elatina Ach.—Minn.
Lecanora elatina ochrophaea Tuck.—Ill.
Lecanora punicea (Ach.) Tuck.—Ia.
Lecanora pallescens (L.) Schaer.—Minn., O.
Lecanora pallescens rosella Tuck.—O.
Lecanora tartarea L. Ach.—Minn., Ill., O., Ind.

- Lecanora melanaspis* (Wahl.) Ach.—Neb., S. D., Kan.
Lecanora cinerea (L.) Sommerf.—Minn., Ia., Ill., S. D.
Lecanora cinerea laevata Fr.—Minn.
Lecanora cinerea gibbosa Nyl.—Minn., Ia.
Lecanora calcarea (L.) Sommerf.—Minn., Ia., Ill., Neb., S. D., Kan.
Lecanora calcarea contorta Fr.—Minn., Ia., Ill., Kan., Wis., (P.).
Lecanora chlorophana (Wahl.) Ach.—Neb., S. D.
Lecanora xanthophana Nyl.—Minn., Ia., Neb., S. D., Kan., Mo.
Lecanora xanthophana dealbata Tuck.—Neb., S. D.
Lecanora Schleicheri (Ach.) Nyl.—Neb.
Lecanora cervina (Pers.) Nyl.—Minn., Ia., Ill., O.
Lecanora cervina pruinosa Ach.—Ill.
Lecanora glaucocarpa (Wahl.) Ach.—Neb., S. D., Kan.
Lecanora fuscata (Schrad.) Th. Fr.—Minn., Neb., S. D.
Lecanora fuscata rufescens Th. Fr.—Minn., Ia., Kan.
Lecanora Bockii (Fr.) Th. Fr.—Minn.
Lecanora privigna (Ach.) Nyl.—Minn., Ia., Ill., O., Neb.
Lecanora privigna pruinosa Auct.—Minn., Ia., Ill.
Lecanora privigna clavus Koerb.—Ia., Kan.
Rinodina oreina (Ach.) Mass.—Minn., Ia., Neb., S. D., Kan.
Rinodina mamillana Tuck.—S. D.
Rinodina ascociscana Tuck.—Minn., Ill.
Rinodina sophodes (Ach.) Nyl.—Minn., Ia., Ill., Neb., Kan.
Rinodina sophodes atrocinerea.—O.
Rinodina sophodes confragosa Nyl.—Minn., Ill.
Rinodina sophodes exigua Fr.—Minn., Ia., Neb.
Rinodina sophodes tephraspis Tuck.—Minn., Ia.
Rinodina Bischoffii (Hepp.) Koerb.—Minn., Ia., Ill., Kan.
Rinodina alboatra Fl.—Ill.
Rinodina lecanorina Mass.—Minn.
Rinodina constans (Nyl.) Tuck.—Ill.
Pertusaria velata (Turn.) Nyl.—Minn., Ia., Ill., O., Ind., Wis. (P.).
Pertusaria multipuncta (Turn.) Nyl.—Minn., Ia., Ill., O., Neb.
Pertusaria ambigens (Nyl.) Tuck.—Ia.

Pertusaria communis DC.—Minn., Ia., Ill., O., Neb., Mo., Kan., Ind.

Pertusaria pustulata (Ach.) Nyl.—Minn., Ia., Ill., O., Neb.

Pertusaria leioplaca (Ach.) Schaer.—Minn., Ia., Ill., O.

Pertusaria glomerata (Ach.) Schaer.—Minn.

Pertusaria globularis Ach.—Ill.

Pertusaria Wulfenii DC.—Ill.

Conotrema urceolatum (Ach.) Tuck.—Ia., Ill.

Gyalecta lutea (Dicks.) Tuck.—Minn., Ia., Neb.

Gyalecta fagicola (Hepp.) Tuck.—Minn.

Gyalecta pineti (Schrad.) Tuck.—Ill.

Gyalecta geoica trivialis Willey.—Ill.

Urceolaria scruposa (L.) Nyl.—Minn., Ia., Ill., Neb., S. D., Kan.

Urceolaria scruposa gypsacea Nyl.—S. D.

Urceolaria scruposa parasitica Sommerf.—S. D.

Urceolaria actinostoma Pers.—Minn., Ia., Kan.

Myriangium Duriaei (Mont. & Berk.) Tuck.—Ill., O.

Stereocaulon coralloides Fr.—Minn.

Stereocaulon paschale (L.) Fr.—Minn.

Stereocaulon condensatum Hoffm.—Minn.

Cladonia alcicornis (Lightf.) Flk.—Ill., S. D.

Cladonia symphycarpa Fr.—Minn., Ia., Ill., O., Neb., Ind.

Cladonia symphycarpa epiphylla (Ach.) Nyl.—Minn., Ia., O.

Cladonia mitrula Tuck.—Minn., Ia., Ill., O., Neb., Kan., Ind.

Cladonia cariosa (Ach.) Spreng.—Minn., Ia., Ill., O., Neb., S. D.

Cladonia decorticata Flk.—Minn.

Cladonia pyxidata (L.) Fr.—Minn., Ia., Ill., O., Neb., S. D., Kan., Ind.

Cladonia pyxidata pocillum Ach.—Ill., S. D.

Cladonia fimbriata (L.) Fr.—Minn., Ia., Ill., O., Neb., Ind.

Cladonia fimbriata tubaeformis Fr.—Minn., Ia., Ill., O., Neb.,

S. D.

Cladonia fimbriata radiata Fr.—Minn.

Cladonia degenerans Flk.—Minn., O.

Cladonia gracilis (L.) Nyl.—Minn., Ia., Ill., O.

Cladonia gracilis symphycarpia Tuck.—Minn.

Cladonia gracilis verticillata Fr.—Minn., Ia., Ill., O., S. D.

Cladonia gracilis cervicornis Fl.—Minn.

Cladonia gracilis hybrida Schaer.—Minn., Ia., O.

Cladonia gracilis elongata Fr.—Minn.

Cladonia comuta (L.) Fr.—Minn., O., Neb.

Cladonia delicata (Ehrh.) Fr.—Minn., Ia., O., Ind.

Cladonia turgida (Ehrh.) Hoffm.—Minn., Ill.

Cladonia turgida (Ehrh.) var. *conspicua* (Schaer.) Nyl.—Minn.

Cladonia cenotea (Ach.) Schaer.—Minn.

Cladonia papillaria molariformis Hoffm.—O.

Cladonia squamosa Hoffm.—Minn., Ia., Ill., O., Neb.

Cladonia squamosa phyllocoma Rabenh.—Minn.

Cladonia delicata (Ehrh.) Fl.—Minn., Ill., Ia.

Cladonia caespiticia (Pers.) Flk.—Minn., Ia., Ill., O., Ind.

Cladonia furcata (Huds.) Fr.—Minn., Ia., Ill., O., Neb., Kan.,
Ind.

Cladonia furcata crispata Flk.—Minn., Ill., O.

Cladonia furcata racemosa Flk.—Minn., Ia., Ill., O.

Cladonia furcata pungens Fr.—Minn.

Cladonia furcata subulata Flk.—Ill., O.

Cladonia rangiferina (L.) Hoffm.—Minn., Ia., O., Kan.

Cladonia rangiferina sylvatica L.—Minn., Ia., Ill., O.

Cladonia rangiferina alpestris L.—Minn., O.

Cladonia botrytis (Hag.) Hoffm.—Neb.

Cladonia amaurocraea (Flk.) Schaer.—Minn.

Cladonia uncialis (L.) Fr.—Minn., Ia.

Cladonia cornucopioides (L.) Fr.—Minn., Ia., O.

Cladonia deformis (L.) Hoffm.—Minn.

Cladonia digitata (L.) Hoffm.—Minn.

Cladonia macilenta (Ehrh.) Hoffm.—Minn., Ia., Ill., O., Neb.,
S. D., Wis.

Cladonia pulchella Schwein.—Ia., Neb.

Cladonia muscigena Eschw.—Ill.

Cladonia cristatella Tuck.—Minn., Ia., Ill., O.

Cladonia cristatella ramosa Tuck.—Ill., O.

Cladonia cristatella paludicola Tuck.—Minn.

Baeomyces byssoides (L.) Schaer.—Minn.

Baeomyces aeruginosus (Scop.) Nyl.—Minn.

Biatora decipiens (Ehrh.) Fr.—Minn., Ia., Neb., S. D., Kan., Mo.

Biatora decipiens dealbata Auct.—Minn., Ia.

Biatora Russellii Tuck.—Ia., O., Neb., S. D., Kan., Mo., Wis. (P.).

Biatora Russellii dealbata Tuck.—Ia.

Biatora icterica Mont.—Minn., Neb., Kan.

Biatora rufonigra Tuck.—Minn., Ill., Mo.

Biatora coarctata (Sm., Nyl.) Tuck.—Minn., Ill., S. D.

Biatora coarctata Brujeriana Schaer.—Minn.

Biatora granulosa (Ehrh.) Hoffm.—Ia., Neb.

Biatora flexuosa Fr.—Minn., Ill.

Biatora viridescens (Schrad.) Fr.—Minn.

Biatora parvifolia (Pers.) Tuck.—Ill.

Biatora vernalis (L.) Fr.—Minn.

Biatora peliaspis Tuck.—Ill.

Biatora russula (Ach.) Mont.—Ill., O., Neb.

Biatora sanguineoatra Fr.—Minn., Ill.

Biatora carnulenta Tuck.—Ia., Ill.

Biatora turgidula (Fr.) Nyl.—Minn., Neb.

Biatora leucophaea Flk.—Minn.

Biatora leucophaea griseoatra Koerb.—Minn.

Biatora uliginosa (Schrad.) Fr.—Minn., Ill.

Biatora myriocarpoides (Nyl.) Tuck.—Minn., Ia., Ill.

Biatora varians (Ach.) Tuck.—Minn., Ia., Ill., O., Neb.

Biatora flavidolivens Tuck.—Minn.

Biatora lucida (Ach.) Fr.—Minn.

Biatora atropurpurea (Mass.) Hepp.—Minn., Ill.

Biatora glauconigrans Tuck.—Minn.

Biatora Heerii Hepp.—Ill.

Biatora oxyspora (Tul.) Tuck.—Minn.

Biatora hypnophila (Turn.) Tuck.—Minn., Ia., Ill., Neb., S. D., Kan.

Biatora Naegelii Hepp.—Minn.

Biatora trachoma Flot.—Ia.

Biatora rubella (Ehrh.) Rab.—Minn., Ia., Ill., O., Neb.

Biatora fuscorubella (Hoffm.) Tuck.—Minn., Ia., Ill., O., Neb., Wis. (P.).

- Biatora suffusa* Fr.—Minn., Ia., Ill., O., Neb.
Biatora atrogrisea (Delis.) Hepp.—Ia., Kans. (B.).
Biatora Schweinitzii Fr.—Minn., Ia., O.
Biatora inundata Fr.—Minn., Ia., Ill., Neb.
Biatora incompta (Borr.) Hepp.—Minn., Ill.
Biatora effusa (Sm.) Hepp.—Ia.
Biatora stigmatella Tuck.—Neb.
Biatora muscorum (Sw.) Tuck.—Minn., Ia., Ill., Neb.
Biatora umbrina (Ach.) Tuck.—Minn., Ia., Ill., Neb.
Biatora chlorosticta Tuck.—Ill.
Biatora chlorantha Tuck.—Ill., O.
Biatora cyphalea Tuck.—Ill.
Biatora campestris Fr.—Ill.
Biatora geophana Nyl.—Ill.
Biatora fossarum (Duf.) Mont.—Ia., Ill.
Biatora resinae Fr.—Ill.
Heterothecium sanguinarium (L.) Flot.—Minn.
Heterothecium sanguinarium affine Tuck.—Minn.
Heterothecium grossum (Pers.) Tuck.—Neb.
Heterothecium leucoxanthum (Spreng.) Mass.—O.
Lecidea caeruleonigricans (Light.) Schaer.—O., Neb.
Lecidea granosa Tuck.—O.
Lecidea tessellina Fr.—Neb., Ill., Kan., Mo.
Lecidea tessellata Flk.—Neb., S. D.
Lecidea polycarpa Fr.—Neb.
Lecidea lactea Flk.—Minn.
Lecidea crustulata Ach.—Minn.
Lecidea lapicida Fr.—Minn.
Lecidea lapicida oxydata Fr.—Minn., S. D.
Lecidea contigua Fr.—Neb.
Lecidea speirea Nyl.—Minn.
Lecidea albocaerulescens (Wulf.) Schaer.—Minn., Ill., O., Ind.
Lecidea platycarpa Ach.—Minn., S. D.
Lecidea enteroleuca Fr.—Minn., Ia., Ill., O., Neb., S. D., Wis.
(P.).
Lecidea enteroleuca achrista Sommerf.—Minn., Neb.
Lecidea enteroleuca theiloplaca Tuck.—Ia.
Lecidea melancheima Tuck.—Minn., Ia.

Lecidea crytidia Tuck.—Ill., Minn., Mo.

Lecidea acclinis Flot.—Minn., Ia., Neb.

Lecidea morio Schaer.—S. D.

Buellia epigaea (Pers.) Tuck.—Neb.

Buellia badia (Fr.) Koerb.—Kan.

Buellia spuria (Schaer.) Arn.—Minn., Ia., Ill., Kan., Mo.

Buellia alboatra (Hoffm.) Th. Fr.—Minn., Ia., Neb.

Buellia alboatra chlorospora Nyl.—Ill.

Buellia alboatra saxicola Fr.—Minn., Ia., S. D., Kan.

Buellia parasema (Ach.) Th. Fr.—Minn., Ia., Ill., O., S. D.,
Ind.

Buellia parasema triphragmia Nyl.—Minn., Ia., Neb.

Buellia dialyta (Nyl.) Tuck.—Minn.

Buellia myriocarpa (DC.) Mudd.—Minn., Ia., Neb.

Buellia myriocarpa polyspora Willey.—Minn., Ia., Ill., Wis.,
(P.).

Buellia pullata Tuck.—Minn., Ia.

Buellia turgescens (Nyl.) Tuck.—Minn.

Buellia Schaereri De Not.—Ill.

Buellia coarcina (Hoffm.) Th. Fr.—S. D.

Buellia colludens (Nyl.) Tuck.—O.

Buellia petraea (Flot.) Tuck.—Minn., O.

Buellia petraea Montagnaei Tuck.—Minn., S. D.

Buellia petraea grandis Flk.—Minn.

Buellia geographica (L.) Th. Fr.—Minn., S. D.

Buellia parmeliarum (Sommerf.) Tuck.—Minn., Neb.

Buellia pertusaricola Willey.—Neb.

Lecanactis premnea (Ach.) Tuck.—O.

Opegrapha demissa Tuck.—Ia.

Opegrapha atra (Pers.) Nyl.—Ill., O.

Opegrapha varia (Pers.) Fr.—Minn., Ia., Ill., O., Neb.

Opegrapha varia pulicaris (Hoffm.) Fr.—Minn., Ia., O., Neb.

Opegrapha varia notha Ach.—Minn.

Opegrapha vulgata (Ach.) Nyl.—Ill., O.

Opegrapha pulvinata Rehm.—Ia.

Opegrapha quaternella Nyl.—Ia.

Graphis scripta (L.) Ach.—Minn., Ia., Ill., O., Neb., Ind.,
Wis. (P.).

Graphis scripta serpentina Ach.—Ia.

Graphis scripta limitata Ach.—Minn., O., Neb.

Graphis scripta recta (Humb.) Nyl.—Minn.

Graphis eulectra Tuck.—Ia., Ill.

Graphis elegans (Sw.) Ach.—Minn.

Graphis dendritica Ach.—Minn., Ill., Neb.

Graphis substriatula Nyl.—Minn.

Arthonia pyrrhula Nyl.—Ill.

Arthonia lecideella Nyl.—Minn., Ia., Ill., O., Wis. (P.).

Arthonia pyrrhuliza Nyl.—Ill., O.

Arthonia dispersa (Schrad.) Nyl.—Minn., Ia., O., Neb., Kan.

(B.).

Arthonia lapidicola Tayl.—Neb.

Arthonia radiata (Pers.) Th. Fr.—Minn., Ia., Ill., O., Neb.

Arthonia punctiformis Ach.—Minn., Ia., Ill., O., Neb.

Arthonia polymorpha Ach.—Ia., Ill., O.

Arthonia taediosa Nyl.—Ill., Neb.

Arthonia diffusa Nyl.—Ill.

Arthonia spectabilis Flk.—Ia., Ill., O., Ind.

Arthonia patellulata Nyl.—Minn., Ill.

Mycoporum pycnocarpum Nyl.—Ill., Neb.

Acolium tigillare (Ach.) De Not.—Minn., Ia., Ill., O.

Calicium trichiiale Ach.—Minn.

Calicium trichiiale stemoneum Nyl.—Minn.

Calicium brunneolum Ach.—Minn.

Calicium chrysocephalum (Turn.) Ach.—Minn., O.

Calicium chrysocephalum filare Ach.—Minn.

Calicium parietinum Ach.—Minn., Ia., Ill.

Calicium curtum Turn. & Borr.—Ill.

Calicium trachelinum Ach.—Ill.

Calicium roscidum trabinellum Nyl.—Ill.

Calicium quercinum Pers.—Minn., Ia.

Calicium hyprellum viride Nyl.—Minn.

Calicium microcephalum (Sm.) Turn. & Borr.—Ill.

Calicium byssaceum Fr.—O.

Calicium populineum De Brogn.(?)—Ill.

Calicium turbinatum Pers.—Minn., Ill.

Calicium tubiforme Mass.—Ill.

- Sphinctrina tigillaris* B. and Br.—Ia.
Coniocybe pallida (Pers.) Fr.—Minn., Ia., Ill.
Endocarpon miniatum (L.) Schaer.—Minn., Ia., Ill., O., Neb.,
 Ind., Wis. (P.).
Endocarpon miniatum Manitense Tuck.—Ill.
Endocarpon miniatum complicatum Schaer.—Minn., Ia., Ill.
Endocarpon miniatum Muhlenbergii Ach.—Minn., Ia., Ill., O.
Endocarpon fluviatile DC.—Minn., O.
Endocarpon arboreum Schwein.—Minn., Ia., Ill., O.
Endocarpon cinereum Nees.—Ill.
Endocarpon hepaticum Ach.—Minn., Ia., Ill.
Endocarpon rufescens Ach.—Ill., Neb.
Endocarpon pusillum Hedw.—Minn., Ia., Ill., O., Neb., Wis. (P.)
Endocarpon pusillum Garovaglii Kph.—Minn., Ia., Ill. (F.).
Thelocarpon prasinellum Nyl.—Minn., Ia.
Segestria Lauveri (Flk.) Tuck.—Ill.
Staurothele Drummondii Tuck.—Minn.
Staurothele umbrina (Wahl.) Tuck.—Minn., Ia., Neb., Wis. (P.).
Staurothele diffractella (Nyl.) Tuck.—Minn., Ia., Ill.
Trypethelium virens Tuck.—O.
Sagedia oxyspora (Nyl.) Tuck.—Minn., Ill., O.
Sagedia castrensis Tuck.—Ill.
Sagedia lactea Kbr.—Ill.
Verrucaria epigaea (Pers.) Ach.—Minn., Ia., Ill.
Verrucaria nigrescens Pers.—Minn., Ia., Ill., O.
Verrucaria fuscella Fr.—Minn., Ia., Ill., Wis. (P.).
Verrucaria prospersella Nyl.—Ill.
Verrucaria rupestris Schrad.—Ia., Ill., O., Neb.
Verrucaria rupestris subalbicans Leight.—Neb.
Verrucaria muralis Ach.—Minn., Ia., Ill., O., Wis. (P.), Kan.
 (B.).
Verrucaria pyrenophora (Ach.) Nyl.—Ia., Ill.
Verrucaria viridula Ach.—Ill.
Pyrenula punctiformis (Ach.) Naeg.—Minn., Ia., Ill., Neb.
Pyrenula punctiformis fallax Nyl.—Minn.
Pyrenula glemmata (Ach.) Naeg.—Minn., Ia., Ill., O.
Pyrenula hyalospora (Nyl.) Tuck.—Minn., Ia.
Pyrenula nitida Ach.—Minn., Ia., Ill., O., Neb.

Pyrenula thaelena (Ach.) Tuck.—Minn., Ia., Ill., O.

Pyrenula cinerella (Flot.) Tuck.—Minn., Ia.

Pyrenula quinqueseptata (Nyl.) Tuck.—Minn.

Pyrenula leucoplaca (Wallr.) Kbr.—Minn., Ia., Ill.

Pyrenula subcinerea (Nyl.) Tuck.—Ill.

Pyrenula glabrata (Ach.) Mass.—Minn., Ia., Ill., O.

Pyrenula lactea (Mass.) Tuck.—Ia., Ill.

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